

REMARKS

This application pertains to a novel self adhesive sheet for the temporary protection of fresh paint surfaces of vehicles, such as cars.

Claims 1-3, 5-15 and 17-19 are pending; claims 4 and 16 being canceled and claim 19 added by this amendment.

The limitations of claim 4 and 16 have been added to claim 1.

Claim 7 stands rejected under 35 U.S.C. 112, second paragraph; the Examiner pointing out that the claim should use Markush language instead of comprising. This claim has now been amended accordingly, and the rejection should now be withdrawn.

Claims 1, 2, 6, 7, 12 and 13 stand rejected under 35 U.S.C 102(b) as anticipated by or, in the alternative under 35 USC 103(a), as obvious over, JP 7117195. Claim 4 is not included in this rejection, however, and the limitations of claim 4 have been added to claim 1. All the remaining claims depend from or otherwise incorporate the limitations of claim 1.

It is therefore believed that the rejection has been obviated, and should be withdrawn.

Claims 1-3, 6, 7, 9, and 11-13 stand rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative under 35 USC 103(a), as obvious over EP 0 707 053 A2. The Examiner contends that this reference "inherently" has an isoprene content that would meet Applicants' claims. There is no evidence that the isoprene content of the reference would meet the range claimed by Applicants however, and this rejection should be withdrawn for that reason alone. In addition, claim 4 is not included in this rejection, and the limitations of claim 4 have been added to claim 1. All the remaining claims depend from or otherwise incorporate the limitations of claim 1.

For both of these reasons, the rejection should now be withdrawn.

Claims 1-18 stand rejected under 35 U.S.C. 103(a) as obvious over either JP Abstract '195 or EP '053, each taken in view of the Macromolecules 1995 article.

Applicants' claims have now been amended to require that the butyl rubber be blended with up to 20 parts by weight of elastomer per 100 parts by weight of butyl rubber.

The JP reference, a translation of which is enclosed with this Amendment, teaches away from such amounts of elastomer. More specifically, at page 5, paragraph [0007] of the enclosed translation, the JP reference teaches that with less than 20 parts by weight of polyisobutylene there are cases where the adhesive strength is poor; whereas Applicants have found that in their self adhesive protective sheet, such amounts are perfect.

No person reading the JP reference would ever be led to blend the butyl rubber with the amount of elastomers specified in Applicants' claims. To the contrary, such persons would be led away from such amounts by the JP reference.

Moreover, the JP reference requires a liquid polyisobutylene; whereas Applicants do not. Note Applicants' comparative Example 12, where a mixture of a viscous/liquid polyisobutylene (Oppanol B 50) and an elastomeric polyisobutylene (Oppanol B 150) was used. The resulting adhesive sheet failed to meet Applicants' test criteria...see the test results on page 14 of Applicants' specification. Applicants' Examples 4, 5 and 6, by contrast, demonstrate that the combination of butyl rubber with an elastomeric polyisobutylene produces perfect results.

Nothing in the other two references would teach or suggest the blending of butyl rubber with up to 20 parts per weight of Applicants' elastomers.

The Examiner's "belief" that the dependent claims involve well known parameters does not constitute evidence of obviousness. Such belief must be supported by evidence.

No combination of JP '195 or EP '053 with the Macromolecules 1995 article could ever lead those skilled in the art to Applicants' novel self-adhesive protective sheet, and the rejection of claims 1-18 under 35 U.S.C. 103(a) as obvious over either JP Abstract '195 or EP '053, each taken in view of the Macromolecules 1995 article

should now be withdrawn.

In view of the present amendments and remarks it is believed that claims 1-3, 5-15 and 17-19 are now in condition for allowance. Reconsideration of said claims by the Examiner is respectfully requested and the allowance thereof is courteously solicited.


CONDITIONAL PETITION FOR EXTENSION OF TIME

If any extension of time for this response is required, Applicants request that this be considered a petition therefor. Please charge the required petition fee to Deposit Account No. 14-1263.

ADDITIONAL FEE

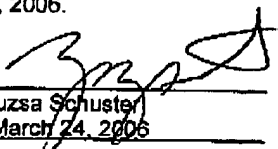
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Respectfully submitted,
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By 
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Date March 24, 2006

Translator's Report/Comments

Your ref: 2004/061JP7 117195 Your order of (date): 19/10/2004

In translating the above text we have noted the following apparent errors/unclear passages which we have corrected or amended:

Page/para/line*	Comment
Table 1	The joint heading for columns 3 and 4 has been amended from "Left to Stand Outdoors for 6 months" to "left to Stand Indoors for 6 months" so as to be consistent with the text in Paragraph [0011]

* This identification refers to the source text. Please note that the first paragraph is taken to be, where relevant, the end portion of a paragraph starting on the preceding page. Where the paragraph is stated, the line number relates to the particular paragraph. Where no paragraph is stated, the line number refers to the page margin line number.

TRC1 1.7.92

Japanese Unexamined Patent Application Laid Open H7-117195

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(19) Japanese Patent Office (JP)

(12) Laid Open Patent Application Gazette (A)

(11) Laid Open Patent Application H7-117195

(43) Date Laid Open: 9th May 1995

(51) Int. Cl ⁶	Recog. Code	File No.	FI	Tech.Disp.Loc.
B 32 B 27/32		Z 8115-4F		
25/08				
27/00		M 8413-4F		
C 09 J 7/02	JJV			
	JJX			
C 09 J 7/02	JLF			
//C 09 J 123/22	JBZ			

Request for Examination: Not yet requested

Number of Claims: Two

Type of Application: OL

Number of Pages in the Japanese Text: Four

(21) Application Number: H5-269007

(22) Date of Application: 27th October 1993

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(54) Title of the Invention: Surface protecting films

(57) Abstract**Purpose:**

To provide surface protecting films with which, even on being left to stand for a prolonged period of time, the painted surface of the article being protected is not contaminated.

Constitution:

A surface protecting film where a pressure sensitive adhesive layer has been formed on one side of a base layer comprising polyolefin-based resin, characterized in that the pressure sensitive adhesive layer contains butyl rubber and liquid polyisobutylene as the main components.

Scope of the Patent Claim

[Claim 1]

A surface protecting film where a pressure sensitive adhesive layer has been formed on one side of a base layer comprising polyolefin-based resin, characterized in that the pressure sensitive adhesive layer contains isobutylene-isoprene copolymer and liquid polyisobutylene as the main components.

[Claim 2]

A surface protecting film, according to Claim 1, in which the amounts of isobutylene-isoprene copolymer and liquid polyisobutylene compounded in the pressure sensitive adhesive layer are from 20 to 200 parts by weight of the latter per 100 parts by weight of the former.

Detailed Description of the Invention

[0001]

Industrial Field of Application

The present invention concerns the surface protecting films which are used to prevent the contamination and scratching of painted steel sheets, synthetic resin mouldings and automobiles for example.

[0002]

Prior Art

From of old, laminates where a re-peelable rubber based or acrylic pressure sensitive adhesive has been coated on a polyester resin, vinyl chloride resin polyethylene resin or such like base material have been used as surface protecting films for protecting painted steel sheets, machine parts, metal domestic appliances and synthetic resin mouldings, for example, from contamination and scratching. Furthermore, paraffin wax has been sprayed onto automobiles for export in order to protect the outer decor from being contaminated or scratched.

[0003]

Problems to be Resolved by the Invention

Painted steel sheets, synthetic resin mouldings and automobiles for export etc., are often stored temporarily indoors or outdoors (generally for from 2 to 12 months) before being handed over to the user. However, when laminates such as those described above are used as surface protecting films there are parts which are sealed and parts which are not covered (for example parts where an air bubble has been trapped) during the temporary storage, differences arise in the paint condition

and there is a problem in that a pattern with different levels of gloss appears after the surface protecting film has been peeled off. Thus various improvements have been made in the pressure sensitive adhesive composition, for example, but a satisfactory system has not been achieved at the present time. Furthermore, in the case of paraffin wax and such like materials there is no film-forming capacity and cleaning off requires physical scraping or washing with an organic solvent such as kerosene, and at the present time much effort is required in terms of liquid retaining procedures and the prevention of environmental pollution.

[0004]

Means of Resolving These Problems

As a result of a thorough investigation carried out with a view to surmounting the problems outlined above, the inventors have developed a surface protecting film which, even when left in place for a prolonged period of time, has no effect on the coated surface of the object which is being protected and which does not require physical scraping or a washing process for its removal. Thus, in essence the present invention is a surface protecting film where a pressure sensitive adhesive layer has been formed on one side of a base layer comprising polyolefin-based resin, characterized in that the pressure sensitive adhesive layer contains isobutylene-isoprene copolymer and liquid polyisobutylene as the main components.

[0005]

The invention is described in detail below. Films of polyethylene, polypropylene, polyethylene/polypropylene block copolymer or ethylene-vinyl acetate copolymer, for example, can be used for the base material layer comprising polyolefin-based resin. The thickness of the film should be selected appropriately in accordance with the details of the object which is to be protected and the particular application, but it is generally within the range from 20 to 150 μm . If the film thickness is less than 20 μm then there are cases where it has little resistance to damage. Furthermore, if it exceeds 150 μm then there are cases where the wrapping properties are poor and there are also cases where it is economically disadvantageous as well.

[0006]

The isobutylene-isoprene copolymer which is used in the pressure sensitive adhesive is a so-called butyl rubber. It is a copolymer in which the proportion of isoprene is from 0.5 to 3 wt% and of which the Flory viscosity average molecular

weight is from 200,000 to 500,000, and the preferred copolymers are those which have a Flory viscosity average molecular weight of from 350,000 to 450,000. The cohesive strength is low if the Flory average molecular weight is less than 200,000 and there are cases where the peeling off properties are poor, and if it exceeds 500,000 there are cases where its solubility is poor. Furthermore, a polyisobutylene of which the Flory viscosity average molecular weight is within the range from 30,000 to 100,000, and preferably within the range from 40,000 to 70,000, is used for the liquid polyisobutylene. If the Flory viscosity average molecular weight is less than 30,000 then the cohesive strength is low, the peeling off properties are poor and this results in some adhesive being left behind, and if it exceeds 100,000 then the adhesive strength is poor and there are cases where peeling occurs before the object reaches the user.

[0007]

The amounts compounded are from 20 to 200 parts by weight, and preferably from 50 to 100 parts by weight, of liquid polyisobutylene per 100 parts by weight of isobutylene-isoprene copolymer. With less than 20 parts by weight of polyisobutylene there are cases where the adhesive strength is poor, and with more than 200 parts by weight there are cases where the peeling off characteristics are poor and this is undesirable. Moreover, in those applications involving temporary storage outdoors, known additives such as ultraviolet absorbers and antioxidants, for example, can be compounded in the base material layer and/or pressure sensitive adhesive layer within ranges where the aim of the invention is not lost. Furthermore, the surface protecting films of this invention can be constructed with the formation of three or more layers where intermediate layers are established in addition to the base material layer and the pressure sensitive layer, depending on the purpose and application.

[0008]

To produce a surface protecting film of this invention, a coating liquid obtained by dissolving the isobutylene-isoprene copolymer and the liquid polyisobutylene in a solvent in which they are soluble should be coated onto the base material layer comprising polyolefin-based resin using a general method, such as reverse coating for example, and dried.

[0009]

Illustrative Examples

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The invention is described in more detail below by means of illustrative examples, but the invention is limited only to not exceeding the outlines presented and it is not limited by the examples described below.

Example 1

Using a polypropylene film (thickness 50 μm , PF341 produced by the Mitsubishi Kasei Co.) for the base material, a pressure sensitive adhesive coating liquid comprising 10 parts by weight of isobutylene-isoprene copolymer (Flory viscosity average molecular weight 350,000, Exxonbutyl 065, produced by the Exxon Chemical Co.), 5 parts by weight of liquid polyisobutylene (Flory viscosity average molecular weight 35,000, Bistanex LM-MS, produced by the Exxon Chemical Co.) and 60 parts by weight of toluene was coated at a rate of 15 g/m² (solid fraction) with the reverse coating method onto the base material and dried by being retained for 2 minutes in an oven at 100°C and a surface protecting film was obtained. The initial strength of adhesion, the peeling off characteristics and the state of contamination of the painted surface after peeling off with the surface protecting film so obtained were evaluated and the results obtained were as shown in Table 1. Moreover, the methods of evaluation were as described below.

[0010]

(1) Initial Adhesive Strength

The surface protecting film obtained was stuck onto a painted steel sheet (paint: acrylic-melamine resin type) and the 180° peel strength was evaluated in accordance with the method specified in JIS K 6854.

[0011]

(2) Peeling Off Characteristics and Painted Surface Contamination After Peeling Off

- a) Left to stand for 6 months indoors
- b) Exposed outdoors for 6 months
- c) Accelerated heat resistance tests, 80°C x 10 hours
- d) Accelerated weather resistance test, 300 hours in a Sunshine Weathermeter

The surface protecting film was stuck onto a painted steel sheet and peeled off again after being left under the conditions a) to d) indicated above, and the peeling off characteristics and the state of contamination of the painted surface at this time was evaluated. The evaluation criteria were as indicated below.

[0012]

Peeling Off Characteristics:

O: Good

 Δ : A little residual adhesive

X: Cohesive failure (all the adhesive left behind)

State of Contamination of the Painted Surface:

O: Good

 Δ : A very slight variation in appearance

X: Pronounced variation in appearance

[0013]

Example 2

Using a polypropylene film (thickness 50 μm) in which known ultraviolet absorber and photostabilizer had been compounded and which blocked ultraviolet radiation (380 nm and below) for the base material, a pressure sensitive adhesive layer of the same type as in Example 1 was formed on this base material using the same method as before and a surface protecting film was obtained. The film so obtained was evaluated in the same way as in Example 1 and the results were as shown in Table 1.

[0014]

Example 3

A pressure-sensitive adhesive layer comprising a pressure-sensitive adhesive coating liquid comprising 10 parts by weight of isobutylene-isoprene copolymer (Flory viscosity average molecular weight 450,000, Exxonbutyl 268, produced by the Exxon Chemical Co.) 3 parts by weight of liquid polyisobutylene (Flory viscosity average molecular weight 46,000, Bistanxe LK-MH, produced by the Exxon Chemical Co.), 0.1 part by weight of antioxidant and 60 parts by weight of toluene was formed in the same way as in Example 1 on the same base material as used in Example 2 and a surface protecting film was obtained. The film so obtained was evaluated in the same way as in Example 1 and the results were as shown in Table 1.

[0015]

Comparative Example 1

A surface protecting film was obtained by coating 15 g/m² (solid fraction) of an acrylic re-peelable type pressure sensitive adhesive (Polybain BPS-3180-3A, produced by the Toyo Ink Co.) onto the same base material as that used in

Example 1. The film so obtained was evaluated in the same way as in Example 1 and the results were as shown in Table 1.

[0016]

Comparative Example 2

A pressure sensitive adhesive coating liquid comprising 10 parts by weight of isobutylene-isoprene copolymer (Exxon 268, produced by the Exxon Chemical Co.), 5 parts by weight of aromatic modified terpene-based hydrocarbon resin (molecular weight 600, YS Resin TO105, produced by the Yasuhara Chemical Co.) and 60 parts by weight of toluene was coated in the same way as in Example 1 onto the same base material as used in Example 1 and a surface protecting film was obtained. The film so obtained was evaluated in the same way as in Example 1 and the results were as shown in Table 1.

[0017]

Comparative Example 3

A pressure sensitive adhesive layer of the same type as in Comparative Example 1 was formed on the same base material as used in Example 2 and a surface protecting film was obtained. The film so obtained was evaluated in the same way as in Example 1 and the results were as shown in Table 1.

[0018]

Comparative Example 4

A pressure sensitive adhesive layer of the same type as in Comparative Example 2 was formed on the same base material as used in Example 2 and a surface protecting film was obtained. The film so obtained was evaluated in the same way as in Example 1 and the results were as shown in Table 1.

[0019]

Comparative Example 5

A pressure sensitive adhesive coating liquid comprising 10 parts by weight of natural rubber (Pale Crepe, Mooney viscosity ML 60 \pm 5), 7 parts by weight of terpene-phenol resin (molecular weight 600, YS Polystar T115, produced by the Yasuhara Chemical Co.), 0.2 part by weight of antioxidant and 60 parts by weight of toluene was coated in the same way as in Example 1 onto the same base material as used in Example 2 and a surface protecting film was obtained. The film so obtained was evaluated in the same way as in Example 1 and the results were as shown in Table 1.

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Table 1

Example No.	Initial Adhesive Strength (g/25 mm)	Peeling Off Characteristics and Contamination of the Painted Surface After Peeling					
		Left to Stand Indoors for 6 months			Sunshine Weathermeter		
		Peeling	Contamination	Peeling	Contamination	Peeling	Contamination
Example 1	480	○	○	X	-	○	-
Comp.Ex.1	320	○	X	X	-	X	-
Comp.Ex.2	950	○	Δ	X	-	X	-
Example 2	480	○	○	○	○	○	○
Example 3	500	○	○	○	○	○	○
Comp.Ex.3	320	○	X	○	X	○	X
Comp.Ex.4	950	○	Δ	○	X	○	X
Comp.Ex.5	780	X	-	X	-	X	-

[0021]

Effect of the Invention

The surface protecting films of this invention do not contaminate the painted surface of the article which is being protected even on being left to stand for a prolonged period of time, and they are very effective as surface protecting films for painted steel sheets, synthetic resin moulding or automobiles for example.